

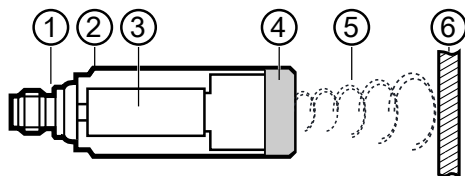
Info card

Ultrasonic sensors



i This info card serves as a supplement to the main position sensors catalogue and to the individual data sheets. For further information and contact addresses please visit our homepage at www.ifm.com.

Operating principle of an ultrasonic sensor



- 1: Connection
- 2: Housing
- 3: Electronics
- 4: Sound transducer
- 5: Sound waves
- 6: Object / reflector

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Important terms

Active zone	Area in front of the sensing face in which the sensor reacts to the approach of objects.
Blind zone	Close range in front of the sound transducer which allows no time of flight measurement
Output function	<p>Normally open: Object in the active zone > output switched.</p> <p>Normally closed: Object in the active zone > output locked.</p> <p>Programmable: Choice between normally closed or normally open.</p> <p>Positive switching: Positive output signal (to L-).</p> <p>Negative switching: Negative output signal (to L+).</p>
Rated insulation voltage	DC units with protection class III: 60 V DC
Rated short-circuit current	For short-circuit-proof units: 100 A
Rated impulse withstand voltage	DC units with protection class III: 60 V DC; 0.8 kV (\pm overvoltage category II)
Power-on delay time	The time the sensor needs to be ready for operation after application of the operating voltage (in the millisecond range) < 300 ms.
Operating voltage	Voltage range in which the sensor operates reliably. A stabilised and smoothed direct voltage should be used. Take into account the residual ripple.
Utilisation category	DC units: DC-13 (control of solenoids)
Hysteresis	Difference between switch-on and switch-off point.
Short-circuit protection	ifm sensors which are protected against excessive current by means of a pulsed short-circuit protection. The inrush current of incandescent lamps, electronic relays and low resistance loads may cause this protection to cut in and turn the sensor off!

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Important terms

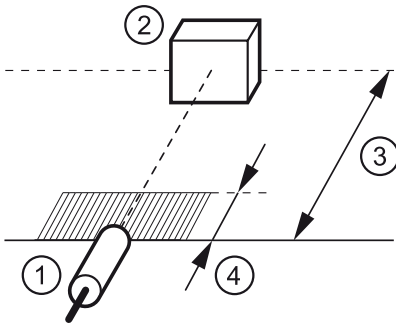
Ultrasonic reflector	<p>The functional specifications refer to a mild steel reflector defined by ifm at maximum range with an edge length of 200 mm (UGT) or 400 mm (UIT).</p> <p>Besides mild steel reflectors, objects that can reflect sound well can also be used as a reflector.</p> <p>The min. reflector size depends on the object size and the angle of aperture of the emitted sound.</p>
Product standard	IEC 60947-5-2
Switch point drift	The shifting of the switch point due to changes in the ambient temperature.
Protection rating	IPxy According to IEC 60529 IP68 Test condition: 1 m water depth for 7 days IP69K To ISO 20653 (replacement for DIN 40050-9)
Current consumption	Current for the internal supply of DC units.
Transport and storage conditions	<p>Unless otherwise indicated in the data sheet, the following applies:</p> <p>Transport and storage temperature: Min. = - 30 °C. Max. = max. ambient temperature according to the data sheet.</p> <p>The relative air humidity (RH) must not exceed 50 % at +70 °C. At lower temperatures, a higher air humidity is permissible.</p> <p>Shelf life: 5 years.</p> <p>Transport and storage height: no restrictions.</p>
Degree of soiling	Ultrasonic sensors are designed for degree of soiling 3.
Maintenance, repair and disposal	<p>If used correctly, no maintenance and repair measures are necessary.</p> <p>Only the manufacturer is allowed to repair the unit.</p> <p>After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.</p>

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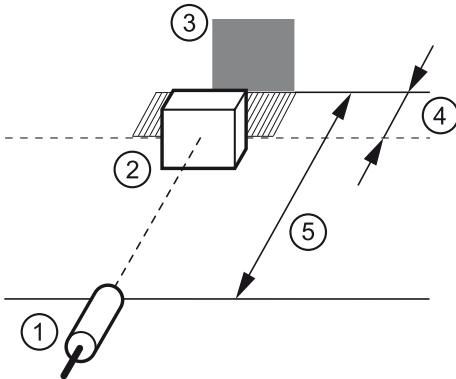
UGT / UIT



- 1: Sensor
- 2: Target (object to be detected)
- 3: Sensing range
- 4: Blind zone

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UGR



- 1: Sensor
- 2: Target (object to be detected)
- 3: Reflector
- 4: Min. distance object / reflector
- 5: Sensing range

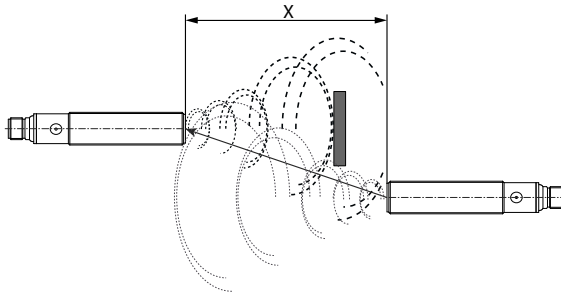
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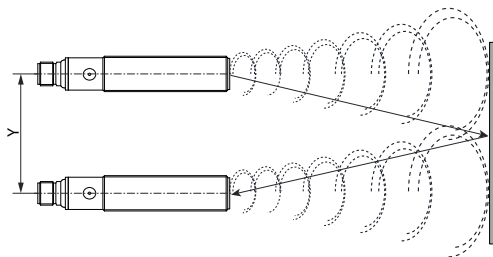
Minimum distances for the installation of identical units

Opposite installation of ultrasonic sensors



Version	Range [mm]	Distance X [mm]
M18 standard	1600	5000
	2200	6600
M18 short / M18 Cube	300	2200
	800	3000
	1200	3800
M30 standard	3500	10500
	6000	18000
	8000	24000

Side-by-side installation of ultrasonic sensors



Version	Range [mm]	Distance Y [mm]
M18 standard	1600	720
	2200	840
M18 short / M18 Cube	300	260
	800	280
	1200	550
M30 standard	3500	1400
	6000	1600
	8000	2150



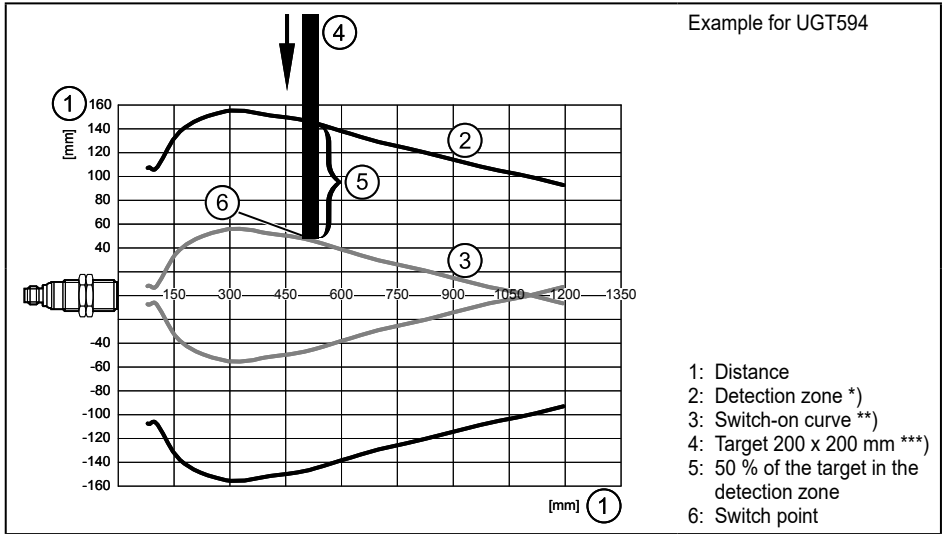
It is imperative to check the reliable function in the selected application.

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Description response curves



*) If half of the target face (standard target) is within the detection zone, the sensor can determine distance values.

**) The switch-on curve describes the switch-on point when the edge of the target (standard target) approaches laterally.

***) Depending on the range.



The sensor switches according to the switch point setting made via teach or IO-Link.

IO-Link *)

General information

This unit has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master) for operation.

The IO-Link interface enables direct access to the process and diagnostic data and provides the possibility to set the parameters of the unit during operation.

In addition, communication is possible via a point-to-point connection with a USB adapter cable**). Further information about IO-Link at www.ifm.com.

Device-specific information

You will find the IODDs necessary for the configuration of the IO-Link unit and detailed information about process data structure, diagnostic information and parameter addresses in the download area of the respective sensor at www.ifm.com.

Parameter setting tools

You will find all necessary information about the required IO-Link hardware and software at www.ifm.com.

*) Depending on the type selected

**) Article no. E30390

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Connection systems




Sensors must not be operated in parallel connection (OR).
Series connection (AND) is not recommended since the power-on delay times, voltage drops and current consumption add up. $U_{B, \min}$ (sensor) and $U_{HIGH, \min}$ (load) must remain unchanged.

Wiring example *)	
<p>1 x pnp</p>	<p>1 x npn</p>
<p>2 x pnp</p>	<p>2 x npn</p>
<p>1 x pnp + 1 x teach input</p>	<p>1 x npn + 1 x teach input</p>
<p>1 x pnp + 1 x analogue</p>	<p>1 x npn + 1 x analogue</p>
<p>1 x analogue + 1 x teach</p>	

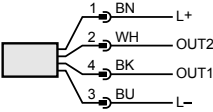
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BK: Black
BN: Brown
BU: Blue
WH: White



- OUT1: Switching output / IO-Link *
- OUT2: Switching / analogue output *

Colours to DIN EN 60947-5-2

*) Depending on the type selected (see data sheet)

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Setting aid IO-Link ultrasonic sensors UGT/UGR

Type	Parameter	Value	Explanations	Factory settings
UGT / UIT	Background suppression	on off	Activate and deactivate the background suppression. Sets the switch point just in front of the background. Only possible in the 1Point mode.	(off)
UGT / UIT / UGR	SSC1 Config. Logic	High active Low active	Configuration of switching signal channel 1: Switch point logic / logic for target detected. High active: normally open (NO) Low active: normally closed (NC)	(High active)
UGT / UIT	SSC1 Config. Mode	1Point Window 2Point	Configuration of switching signal channel 1: Selection of the functions for SSC1. 1Point: Sensor switches before the taught point. Window: Sensor switches in the selected area. 2Point: Sets a switch-on point (SP2) and a switch-off point (SP1)	(1Point) or (Window)* *Depending on the article no.
UGT / UIT / UGR	SSC1 Config. Hyst	... mm	Configuration of switching signal channel 1: Setting of the hysteresis.	UGT (5 mm) UGR (14 mm)
UGT / UIT / UGR	Teach SP TP1 / Teach SP TP2	virtual teach button	Virtual teach button. Sensor detects the current sensing range for the selected point.	-
UGT / UIT / UGR	SSC1 Switch-On delay	... ms	Adjustable start-up delay (max. 2,000 ms).	(0 ms)
UGT / UIT / UGR	SSC1 Switch-Off delay	... ms	Adjustable switch-off delay (max. 2,000 ms).	(0 ms)
UGT / UIT	SSC1 Param. SP1	... mm	Manual entry of switch point 1.	(max. range)
UGT / UIT	SSC1 Param. SP2	... mm	Manual entry of switch point 2. SP2 only works if "SSC1 Config. Mode" is not set to the one-point mode	(min. range)
UGR	SSC1 Param. SP1	... mm	Manual entry of switch point 1 on the reflector. Sensor switches on all distances before this point.	-
UGR	SSC1 Param. SP2	n.a.	No selection possible for UGRxxx.	-

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Type	Parameter	Value	Explanations	Factory settings
UGR	Background value	... mm	Distance to the background. Background value must be greater than (SP1 + Hyst). Background value is set via teaching.	-
UGT / UIT / UGR	Loc	Loc uLoc	Locking or unlocking of the key on the sensor.	(uLoc)
UGT / UIT / UGR	Power cycles	#number	Number of switching operations since delivery.	-
UGT / UIT / UGR	Operating hours	[h]	Operating hours since delivery.	-
UGT / UIT / UGR	FILT	OFF LOW MEdi HIGH	<p style="text-align: center;">Filter</p> <p>1: The lower the filter, the higher the susceptibility to failure. 2: The lower the filter, the higher the switching frequency. 3: The higher the filter, the longer the response time.</p>	(MEdi)

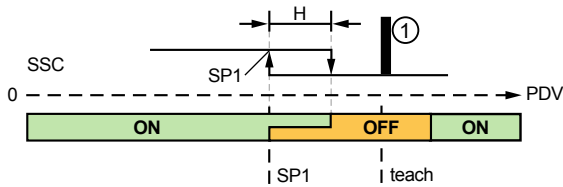
Versions	Switching frequency (Hz) / Analogue response time (ms)			
	OFF	LOW	MEdi	HIGH
UG, 300 mm	20	13	10	5
UG, 800 mm	18	6	5	3
UG, 1200 mm	13	5	3	2
UG, 1600 mm	7/150	6/200	3/400	2/800
UG, 2200 mm	5/150	4/200	2/400	1/800
UI, 3500 mm	1/400	1/400	1/400	1/400
UI, 6000 mm	1/400	1/400	1/400	1/400
UI, 8000 mm	1/400	1/400	1/400	1/400

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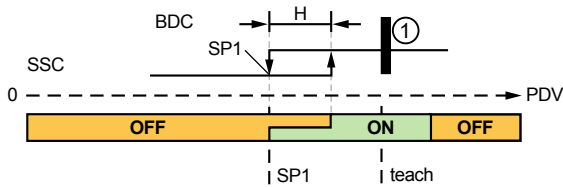
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Switch point definition IO-Link for UGR



Normally open: (switch point logic = 0)
SP1 = teach - (teach x 0.1) + H Switch-on point
SP1 + H Switch-off point



Normally closed: (switch point logic = 1)
SP1 = teach - (teach x 0.1) + H Switch-off point
SP1 + H Switch-on point

- SP Switch point
- H Hysteresis
- SSC SwitchingSignalChannel
- PDV ProcessDataVariable
- 1 Reflector

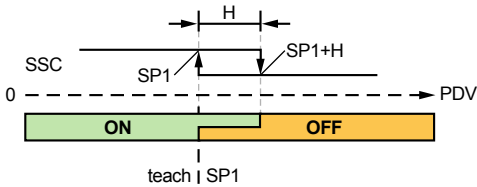
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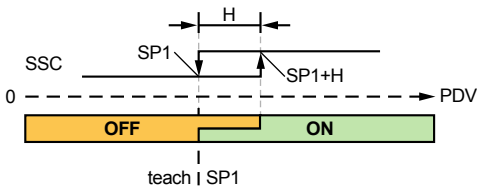
Switch point definition IO-Link for UGT / UIT

Single point mode to smart sensor profile



Normally open: (switch point logic = 0)

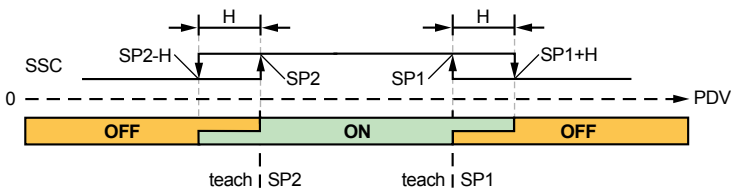
SP1 Switch-on point
SP1 + H Switch-off point



Normally closed: (switch point logic = 1)

SP1 Switch-off point
SP1 + H Switch-on point

Window mode to smart sensor profile



Normally open: (switch point logic = 0)

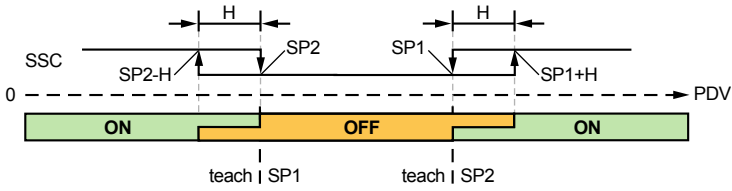
SP1 Switch-on point
SP1 + H Switch-off point

SP2 Switch-off point window
SP2 + H Switch-on point window

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Normally closed: (switch point logic = 1)

SP1 Switch-on point

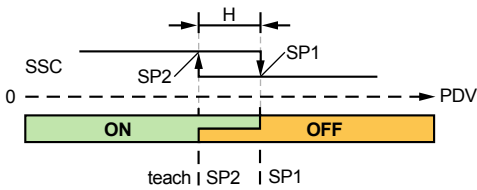
SP1 + H Switch-off point

SP2 Switch-on point window

SP2 + H Switch-off point window

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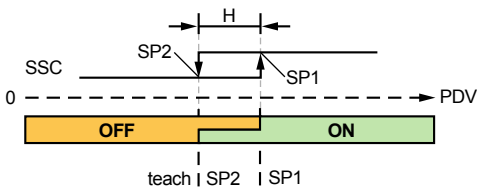
Two-point mode (presence detection) to smart sensor profile



Normally open: (switch point logic = 1)

SP1 Switch-on point

SP2 Switch-off point



Normally closed: (switch point logic = 0)

SP1 Switch-on point

SP2 Switch-off point



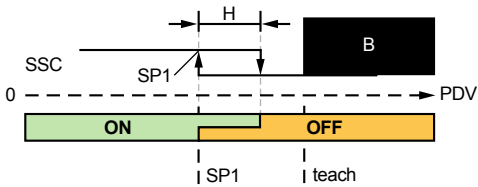
Condition:
SP1 > SP2

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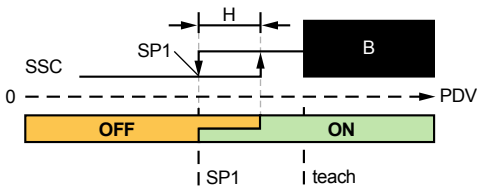
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Background suppression



Normally open: (switch point logic = 0)
SP1 = teach - 2 x H Switch-on point
SP1 + H Switch-off point



Normally closed: (switch point logic = 1)
SP1 = teach - 2 x H Switch-off point
SP1 + H Switch-on point

SP Switch point
H Hysteresis
SSC SwitchingSignalChannel
PDV ProcessDataVariable
B Background suppression

